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FLORENCE PROJECT

August 9, 1995

Ms. Shirin Tolle
Aquifer Protection Project Officer
Arizona Department of Environmental Quality
3033 North Central Avenue
Phoenix, Arizona 85012

15-1899/05

Subject: Magma Copper Company, Florence Project
Monthly Progress Report
July 1995

Dear Ms. Tolle:

Magma Copper Company (Magma) is pleased to provide the July 1995 Progress Report for the Florence Project.

Drilling and Well Installation Progress

A total of 45 wells have been installed: 18 monitoring wells; 13 pumping wells; and 14 observation wells (see Table 1). All of the proposed monitoring wells have been installed. Estimated production, where development has been completed, and the depth of each pump location, are shown on Table 1. The estimated production rates are field estimates of water production observed during the initial development and represent an estimate of the anticipated production rates expected for each well.

A full suite of geophysical logs were completed in P13.1-O during July (see Table 2). No packer testing activities occurred in July (see Table 3). Aquifer tests have now been completed on four well clusters (P39-O, P12-O, PW7-1, and P19.2-O). Analysis and presentation of the test results is scheduled to be completed during the month of August.

Drilling in August is scheduled to include the completion of the remaining aquifer test wells, and the completion of the vadose zone sampling program.

Sampling Activities

Groundwater samples were collected from 16 of the 18 monitoring wells. M7-GL and M9-S were not sampled because of pump malfunctions which have now been resolved. Water samples were also collected from the irrigation canal, air shaft, four irrigation wells and the

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drill water supply tank. Laboratory reports are anticipated to be issued by August 18, 1995. This sampling was conducted in accordance with the February 2, 1995 Aquifer Protection Permit (APP) Application Work Plan and subsequent modifications of April 28, 1995. In addition, this sampling was also conducted in accordance with the Groundwater Sampling and Analysis Plan submitted to the Arizona Department of Environmental Quality (ADEQ) on June 27, 1995. Groundwater sampling of all monitoring wells is scheduled to begin the week of August 14, 1995.

Modeling Activities

Modeling activities during July were focused on the domain boundaries and mesh structure for the regional model. On July 11, 1995 a full description of the United States Environmental Protection Agency (USEPA) of the model and the initial input parameters was presented to both the ADEQ and the USEPA. Based on these discussions, several worst case scenarios will be simulated, including extreme flood and drought scenarios and extreme changes in the groundwater conditions near the proposed in-situ mine area. At this time the model is under calibration and hydraulic input parameters from both historical testing data and current field investigations are being incorporated into the model.

Column testing continues during July at METCON Laboratories in Tucson, Arizona. These tests are anticipated to be completed in late August. X-ray diffraction (XRD) analysis are completed and are under evaluation at this time. Final analysis of the XRD data is scheduled for August 18, 1995.

Aquifer Protection/Underground Injection Control (UIC) Permit Activities

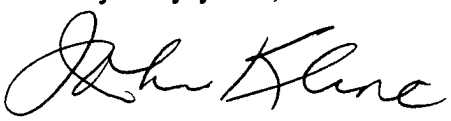
The second update meeting for the APP Application was held on July 11, 1995, and included a review of the input parameters for the groundwater flow model. Both the ADEQ and the USEPA attended the meeting. Additional comments on the April 28, 1995 data submittal were discussed and a brief review of the groundwater sampling program provided valuable input to enhance the existing program. Additional review comments are anticipated during the scheduled APP Application meeting on August 16, 1995.

Additional Activities During July

Only one aquifer test was completed on Well P39-O during July. The duration of the aquifer test was approximately 10,000 minutes. Short-duration drawdown tests were completed at the three monitoring well clusters. Evaluation of this data from this testing will be completed in August.

The third APP Application meeting is scheduled for Wednesday, August 16, 1995 at the ADEQ office in Phoenix at 10 a.m. The Florence Project Team looks forward to presenting the aquifer tests rationale, packer testing rationale, proposed groundwater modeling scenarios, and the preliminary facility designs to the ADEQ. If you have any questions, please do not hesitate to contact me at (520) 868-5094 or Mr. Steve Mellon at Brown and Caldwell, telephone number (602) 222-4445 or (520) 868-0474.

Very truly yours,



John Kline
Environmental Project Manager

SAM:kw
Attachment

cc: Mr. Bruce Gaither, Digital Precision GeoScience
Mr. Jose Gutierrez, USEPA
Mr. Steve Mellon, Brown and Caldwell
Mr. Dan Ramey, Magma Copper Company
Mr. Terry Steinborn, Applied Research Associates, Inc.

Table 1. Well Installation Data

Well Number	Total Depth (feet)	Screen Material				Riser Pipe		Estimated Production Rate (gpm)[a]	Depth of Dedicated Pump (feet)
		Type	Diameter (inches)	Slot Size (inches)	Depth (feet)	Type	Diameter (inches)		
M1-GL	420	PVC	5	0.08	315 to 355	PVC	5	Developed	280
M2-GU	270	PVC	5	0.08	198 to 258	PVC	5	15	180
M3-GL	370	PVC	5	0.08	298 to 338	PVC	5	10	200
M4-O	510	PVC	5	0.08	405 to 465	PVC	5	2	380
M5-S	613	PVC	4	0.08	516 to 576	LCS	5 and 4[c]	Developed	500
M6-GU	590	PVC	5	0.08	524 to 564	PVC	5	7.5	500
M7-GL	940	PVC	4	0.08	859 to 919	LCS	5 and 4[d]	1.1	260
M8-O	1,115	PVC	4	0.08	1,010 to 1,070	LCS	5 and 4[e]	25	580
M9-S	1,578	SS	4	0.08[f]	1,510 to 1,570	LCS	5 and 4[g]	0.9	NS
M10-GU	290	PVC	5	0.08	218 to 258	PVC	5	40	200
M11-GL	370	PVC	5	0.08	290 to 330	PVC	5	5 to 10	260
M12-O	510	PVC	5	0.08	420 to 480	PVC	5	10	260
M13-S	943	PVC	5	0.08	851 to 911	LCS	5	Developed	840
M14-GL	950	PVC	5	0.08	778 to 838	LCS	5	5 to 10	260
M15-GU	630	PVC	5	0.08	554 to 594	LCS	5	20	260
M16-GU	690	PVC	5	0.08	598 to 658	PVC	5	Developed	260
M17-GL	1,132	PVC	5	0.08	938 to 998	LCS	5	Developed	340
M18-GU	240	PVC	5	0.08	178 to 218	PVC	5	Developed	170
O3-GL	395	PVC	5	0.08	325 to 365	PVC	5	30	NS
P5-O	800	PVC	6	0.08	414 to 770[h]	PVC	6	Developed	NS
O5.1-O	880	PVC	4	0.08	672 to 832	LCS	5 and 4a	Developed	NS
O5.2-O	880	PVC	4	0.08	712 to 771	PVC	4	Developed	NS
P12-O	999	PVC	6	0.02	440 to 940	PVC	6	70	NS
O12-O	970	PVC	4	0.08	434 to 929	PVC	4	Developed	NS
O12-GL	395	PVC	5	0.08	325 to 365	LCS	5	40	NS
P13.1-O	1,471	PVC	6	0.08	772 to 1,450	LCS	6	NA	NS
P13.2-O	1,400	LCS	6	0.08	780 to 1,380	LCS	6	NA	NS

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		Type	Diameter (inches)	Slot Size (inches)	Depth (feet)	Type	Diameter (inches)		
P15-GL	500	PVC	6	0.08	421 to 481	PVC	6	Developed	NS
P15-O	1,380	PVC	6	0.08	550 to 1,300	PVC	6	Developed	NS
O15-O	1,330	PVC	4	0.08	632 to 1,297	PVC	4	Developed	NS
P19.1-O	630	PVC	6	0.08	402 to 602	PVC	6	Developed	NS
P19.2-O	630	PVC	6	0.08	404 to 604	PVC	6	Developed	NS
O19-O	630	PVC	4	0.08	410 to 610	PVC	4	Developed	NS
O19-GL	460	PVC	5	0.08	375 to 435	PVC	5	Developed	NS
P28.1-O	520	PVC	6	0.08	399 to 499	PVC	6	Developed	NS
P28.2-O	519	PVC	6	0.08	398 to 498	PVC	6	Developed	NS
P28-GL	320	PVC	5	0.08	279 to 309	PVC	5	Developed	NS
O28.1-O	530	PVC	4	0.08	395 to 495	PVC	4	Developed	NS
O28.2-S	510	PVC	4	0.08	454 to 494	PVC	4	Developed	NS
O28-GL	320	PVC	4	0.08	277 to 307	PVC	4	Developed	NS
P39-0	915	PVC	6	0.08	471 to 826	PVC	6	Developed	NS
O39-0	916	PVC	5	0.08	474 to 890	PVC	5	Developed	NS
P49-O	1,288	PVC	6	0.08	807 to 1,222	PVC	6	Developed	NS
O49-O	1,280	PVC	4	0.08	832 to 1,232	PVC	4	Developed	NS
O49-GL	740	PVC	5	0.08	660 to 720	LCS	5	Developed	NS

[a] Preliminary data collected during development only.
[b] Tapered riser pipe from 5-inch to 4-inch casing at 494 feet below the ground surface (bgs).
[c] Tapered riser pipe from 5-inch to 4-inch casing at 516 feet bgs.
[d] Tapered riser pipe from 5-inch to 4-inch casing at 593 feet bgs.
[e] Tapered riser pipe from 5-inch to 4-inch casing at 591 feet bgs.
[f] Wire wrap screen.
[g] Tapered riser pipe from 5-inch to 4-inch casing at 502 feet bgs.
[h] Screen interval contains 220 feet of slotted screen and 140 feet of blank casing because of material shortages. Location of blank casings were placed in areas of lower permeability as determined by the geophysical logs.
[i] Approximate depth.

gpm = gallons per minute
LCS = low carbon steel
NS = no dedicated pump set
PVC = polyvinyl chloride
NA = not available
SS = stainless steel

Table 2. Geophysical Logs

Hole Number	Total Depth (feet)	Type of Geophysical Log										Comments
		TV-3D	Resistivity	S.P.	Caliper	Temperature	Gamma	Neutron	Density	Sonic	Spinner	
M1-GL	420	NR	✓	NR	NR	NR	✓	NR	NR	NR		
M5-S	610	NR	✓	✓	✓	NR	✓	✓	✓	✓		Clay Seam in Gila Conglomerate
M6-GU	590	NR	NR	NR	NR	NR	NR	NR	NR	NR		
M7-GL	940	NR	NR	NR	NR	NR	NR	NR	NR	NR		
M8-0	1,115	NR	NR	NR	NR	NR	NR	NR	NR	NR		
M9-S	1,578	✓	✓	✓	✓	✓	✓	✓	NR	✓		Clay Seam in Gila Conglomerate
M10-GU	290	NR	NR	NR	NR	NR	NR	NR	NR	NR		
M11-GL	370	NR	NR	NR	✓	NR	NR	NR	NR	NR		Backfill Quantities
M12-O	510	NR	NR	NR	NR	NR	NR	NR	NR	NR		
M13-S	943	NR	✓	✓	✓	NR	✓	✓	✓	✓		Clay Seam in Gila Conglomerate
M14-GL	950	NR	✓	✓	✓	✓	✓	✓	NR	✓		Clay Seam in Gila Conglomerate
M17-GL	NR	NR	✓	NR	NR	NR	✓	NR	NR	NR		

Table 2. Geophysical Logs

Hole Number	Total Depth (feet)	Type of Geophysical Log										Comments
		TV-3D	Resistivity	S.P.	Caliper	Temperature	Gamma	Neutron	Density	Sonic	Spinner	
O3-GL	395	NR	NR	NR	NR	NR	NR	NR	NR	NR		
O5.1-O	880	NR	✓	✓	✓	NR	✓	✓	✓	✓		Clay Seam in Gila Conglomerate
O5.2-O	880	NR	✓	✓	✓	✓	✓	✓	NR	✓		Clay Seam in Gila Conglomerate
P12-0	999	NR	✓	✓	✓	NR	✓	✓	✓	✓		Reverse Circulation
O12-O	970	NR	NR	NR	NR	NR	NR	NR	NR	NR		
O12-GL	395	NR	NR	NR	✓	NR	NR	NR	NR	NR		Backfill Quantities
P28.2-O	NR	NR	✓	NR	NR	NR	✓	NR	NR	NR		
O28.2-S	1,510	NR	✓	NR	NR	NR	✓	NR	NR	NR		
P19.1-O	✓	✓	✓	✓	NR	✓	✓	✓	NR	✓	✓	Fault Contact
O19-GL	NR	NR	✓	NR	NR	NR	✓	NR	NR	NR		
O39-0	916	NR	✓	✓	✓	NR	✓	✓	✓	✓		Reverse Circulation
P49-O	1,280	NR	✓	✓	✓	✓	✓	✓	NR	✓		Clay Seam in Gila Conglomerate

Table 3. Packer Test Data			
Hole Number	**Test Intervals (feet)**	**Fracture Gradient[a] (pounds per square inch per foot)**	**Comments**
MCC-533	860 to 895	0.71	Quartz Monzonite in the Oxide Zone
	740 to 775	0.73	Quartz Monzonite in the Oxide Zone
	650 to 685	0.80	Quartz Monzonite in the Oxide Zone
	605 to 640	0.82	Quartz Monzonite in the Oxide Zone
MCC-537	470 to 520	0.68	Quartz Monzonite in the Oxide Zone
	390 to 440	0.66	Quartz Monzonite in the Oxide Zone
MCC-541	1,062 to 98	0.93	Granodiorite in the Oxide Zone
	984 to 1,010	0.87	Granodiorite in the Oxide Zone
MCC-544	1,255 to 1,318@	0.69	Sulfide
	1,003 to 1,069@	0.84	Quartz Monzonite in the Oxide Zone
	899 to 965@	0.74	Quartz Monzonite in the Oxide Zone
	425 to 485@	Unable to Fracture	Quartz Monzonite in the Oxide Zone
MCC-540	1,061 to 1097	0.93	Granodiorite in the Oxide Zone
	984 to 1,020	0.84	Trachy Andesite Dike
	651 to 702	0.82	Quartz Monzonite in the Oxide Zone
	504 to 555	Unable to Fracture	Quartz Monzonite in the Oxide Zone

[a] $\pm$ 1 percent error for 2,000 pounds per square inch (psi).

NA = not available